

ABSTRACT

An electrolyzer structure is provided that is suitable for use in a method that produces hydrogen by steam electrolysis by feeding reducing gas to an anode side and feeding steam to a cathode side of an electrolyzer that is partitioned into the anode side and the cathode side by a diaphragm of solid oxide electrolyte, and feeding power to the anode and cathode of the electrolyzer.

One embodiment of the present invention relates to an apparatus that produces hydrogen by high temperature steam electrolysis and that comprises an electrolyzer partitioned into an anode side and a cathode side by a solid oxide electrolyte diaphragm, a conduit that feeds reducing gas to the anode side of the electrolyzer, and a conduit that feeds steam to the cathode of the electrolyzer, in which a metal cermet stable in a reducing atmosphere is used as the material of the anode and the cathode. Another embodiment of the present invention relates to a method of producing hydrogen by high temperature steam electrolysis for reducing electrolysis voltage by feeding steam to a cathode side and feeding hydrocarbon-containing gas to an anode side for reaction with oxygen ion, the cathode side and the anode side being provided in a high temperature steam electrolytic apparatus in which an electrolyzer is partitioned into the anode side and the cathode side using a solid oxide electrolyte as the diaphragm, wherein offgas discharged from the anode side of the electrolytic

apparatus is admixed into the hydrocarbon-containing gas that is fed to the anode side of the electrolytic apparatus.